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NOTES ON THE HABITS AND THE COLORATION OF THE COMMON STARLING (*STURNUS VULGARIS*).

By FREDK. J. STUBBS.

As a youngster living on a south-western wing of the Pennines, and familiar with the relations between Starlings and cattle, I could hardly help noticing one little detail of habit in which the bird did not agree with the books—for never, under any circumstances, did I see a Starling perch on the back of either cow or sheep. On railway journeys to other counties we watched for the first exhibition of the habit almost as eagerly as we anticipated the first Sheld-Duck or the first ant-hill, and we even remembered certain counties as places in which the Starling had the normal habit described or referred to so often in our books. I think that in a way we viewed our own birds as abnormally spiritless, in keeping with the uninteresting landscape. Unfortunately, I made few regular notes on the habits elsewhere, and in the course of years my recollections have been tumbled about somewhat. The average adult is sure to find his memory far from safe on this point if he has been in the habit of observing the bird in many localities. One thing, however, I can state with confidence—in that part of Eastern Lancashire extending from Cheshire ten or twelve miles along the Yorkshire border, a district in which I have had exceptional opportunities for observing Starlings amongst cattle, it has never been my experience to see the bird rest even for an instant on any animal. I shall not go so far as to say that it never does so, but during a stretch of years when I often puzzled myself trying to find a solution of the problem I did not once see the action.

During this period, as I have already indicated, I frequently noticed the picturesque habit in other districts, and I have had

abundant reasons for regretting that I did not keep actual written records of all these places. Indeed, I cannot give the range of the peculiarity even in the county itself; I have seen the perching in the Lake District, and I think also in the extreme west of Lancashire. I can be quite definite in giving the Isle of Man, North Wales, and most parts of South-eastern England as localities where the Starling does, either frequently or rarely, perch on living cattle or sheep. The birds are said to search the fleece for "ticks" (*Melophagus ovinus*), but, although watching them very closely, I have never been sure that this is the fact.

This curious difference in habit may appear a most trivial thing, but as a psychological problem it remains insoluble to me, and appears to have a bearing on the wider problem of distribution. It is difficult to imagine that we have on these Pennine slopes a colony of Starlings unaffected by migrants from other localities, and equally difficult to think that the Lancashire birds sink their habits in visiting another county, or that the immigrants alter theirs when they reach Lancashire. Others besides the present writer would be glad to see notes from readers of 'The Zoologist' resident elsewhere in our islands. I can add that in answer to one query addressed to a contributor as to the habits of the bird in this locality I received the reply: "Your question is easily answered. I have never seen a Starling perch on either a cow or a sheep in my life"—a scrap of information that must read strangely to an observer living in, let us say, the county of Surrey.

As a British bird, the Starling has fluctuated numerically and otherwise in a remarkable manner. No one has yet been to the trouble of studying these changes so far as England is concerned, but Scotland has been more fortunate, for there Mr. J. A. Harvie-Brown (*Annals Scot. Nat. Hist.* 1895, pp. 1-22, and map; and a note by Mr. R. Service, pp. 92-96) has carefully described the past and the present status of the bird. "From time immemorial" it has been common in the Orkneys, the Shetlands, and the Outer Hebrides, and apparently unknown on the mainland throughout the whole of Scotland.* About a

* Writing now from memory, I fancy it was Sir William Jardine who recorded how he saw his first wild Starling at York, during a coach journey to London; and several non-ornithologists from across the Border, at the latter end of the eighteenth century, have written to the same effect.



hundred years ago, according to Mr. Harvie-Brown, the species began to spread on the mainland, and is now common throughout Scotland. No reason has been given, and we do not know whether the new-comers have arrived from the west, south, or east. I am almost quite certain that I have seen the bird perch on cattle in Scotland, but I would like to suggest now that naturalists domiciled in that half of our island, or in the western islands, place on record the present habits of the bird. Observations from the Orkneys or the Hebrides would be peculiarly valuable.

A superficial study of the copious literature relating to the Starling gives one the idea that its numbers have not always been constant in England. In 1564 it was apparently too common in some parts, for an Act (8 Eliz. c. 15) was then passed, ordering that one penny per dozen be paid for "Stares" heads: these were Starlings, and not any species of Thrush, for we learn in the Act of their partiality for dovescots.

Gilbert White treats the Starling in such a manner in his "Letters" that we have reason to suspect it was not in his day a common bird near Selborne, but that his knowledge of it was gained in other localities. The only mention I can see in going through one edition, and in examining the indexes of two or three more, is in Letter XI. to Daines Barrington, and this passage read in conjunction with the rest of the book, and especially Letters I. and II. to Barrington, seems to support the suggestion. Bishop Stanley, in his 'History of Birds,' writing (I think from Alderley, in Cheshire) towards the middle of last century, remarks that in former years the Starling was far more numerous; and the ignorance shown by good men like Montagu, Mudie, Knapp, and others (who all at one time or another believed the young to be a distinct species), also suggests that it was not so evenly distributed during the nesting season as it is to-day. As a common breeding bird it is but a recent addition to Cornwall and Devon.

Within the past few years the marked increase of the Starling in Great Britain has led to some notable speculations, especially on the part of the late Dr. R. B. Sharpe. After accumulating a great deal of material he was forced (reluctantly, he confessed) to leave the problem unsolved. Other students were more easily satisfied, and some who were influenced by

popular writers have every confidence in the existence of (a) an "Old English Starling," and (b) a "Siberian Starling" that is rapidly ousting the native race. I will deal with this question of subspecies shortly, but would first like to draw attention to the roosting habits. To-day, in England, the bird is best known as passing the night in trees, bushes, or reed-beds; occasionally I have seen them congregating in ivy-covered cliffs, but never in buildings until the present spring, when I discovered that large numbers spent the night in the stonework at the summit of the Nelson Monument in London—a strange sight and an unusual chorus for Trafalgar Square. Macgillivray describes Starlings roosting in winter in caverns in the Hebrides, and Montagu and other old authors speak of them congregating in winter in dovecots for the sake of the warmth.

In returning to the question of the races of the Starling, I cannot do better than quote the words of Dr. R. B. Sharpe (Cat. Birds B. M., vol. xiii. p. 29):—"The Common Starling of Europe is easily distinguished by its colours—green head, green ear-coverts, green throat, green scapulars and wing-coverts, and steel-blue or greenish flanks. The Siberian Starling (*S. menzbieri*), which visits India in winter, and which has always been called *S. vulgaris*, differs from the English bird in having a reddish-purple head, ear-coverts, and throat, and also in its violet-purple flanks. In the British Islands, and doubtless in other parts of Europe, intermediate examples occur, more frequently in winter, when a large immigration of foreign Starlings into England takes place. These intermediate specimens vary to any extent as regards the amount of purple on the head and throat, but they are never, so far as my experience goes, true *S. menzbieri*, as they have always green ear-coverts. It may well be that a species exists in Eastern Europe which has a purple head and throat and green ear-coverts, and that this bird migrates southwards and westwards in winter, and that numbers of them stop in England and mate with our indigenous birds, which have in consequence been made to vary more or less in the direction of a purple head and throat."

Writing sixteen years later (Hist. Coll. Brit. Mus. (N. H.), vol. ii. p. 480), Dr. Sharpe refers again to the subject, and speaks of the course and extent of his observations. He writes:

"No practical result came from all this trouble and expenditure. . . . The conclusion arrived at was that, while Starlings from Western England were apparently true *Sturnus vulgaris*, indistinguishable from the typical Swedish bird, a number of those from the east and south of England were intermediate between the true *S. vulgaris* and *S. menzbieri*, being much more purple than green on the head. The inference was that the Siberian Starling, extending its range westward, interbred with the ordinary *S. vulgaris* of Western Europe, and that the result was a mixture, just as in the case of the Carrion Crow and the Hooded Crow."

No observer can deny that the Starling in England to-day is, for good or for bad, directly or indirectly, a tremendous factor in agriculture and forestry. Its yearly increase in most districts (if not in all) is obvious to everybody. We can hardly collect too much information relating to its range, habits, or past history, and we cannot too greatly deplore the way in which most students have neglected these questions. Perhaps the country is now too well colonized for us to discover the sources and the paths of the invaders, or even to be certain that the present hordes are descended or not from the indigenous stock. Something may be derived from a study of the psychology of the bird, as I have indicated in the first part of this paper, but I shall endeavour to prove that we can get but equivocal results from the consideration of colour, or of races or subspecies that are based on colour.

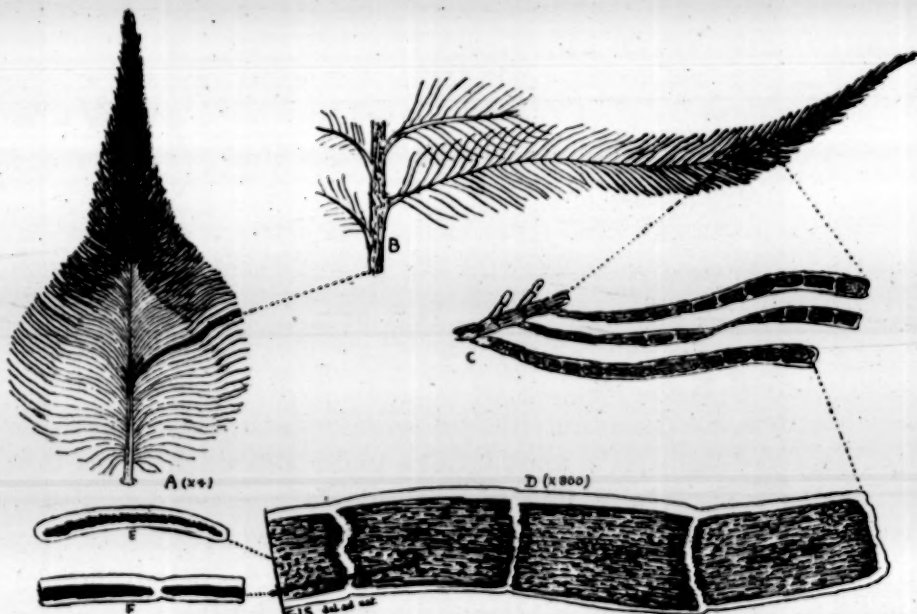
The plumage of the Starling offers a good example of what have been not very happily called "metallic colours," but the term is a well-known one, and it is not necessary here to present a substitute. A Kingfisher's feathers, although they change in accordance with the positions of the observer and the light, are not metallic in the ordinary acceptance of the word (*cf.* Zool. 1910, pp. 462-470), but the feathers of the Peacock, Humming-Bird, the speculum of a Duck's wing, &c., are metallic. Several attempts have been made to solve the problem of the cause of these changing effects, and two distinct explanations have been given, but only one has been generally accepted by British ornithologists. Unfortunately, this one suffers from two defects: it is based upon the presence of structures that have never been

seen in any feather, and upon a complete reversal of the laws governing the action of a prism upon a beam of light. This theory, which originated more than half a century ago with Prof. B. Altum ('Naumannia,' 1854, pp. 293-304; and 'Journal für Ornithologie,' 1854, p. xix.), suggests that the colours of metallic feathers are due to the action of a series of prisms in the structure of the feather; but his papers were not based upon any rigorous microscopical examination, and his views could never have attained their present currency in England had they not been repeated in 1882 by Dr. H. Gadow (P. Z. S., 1882), who was cautious enough to add (p. 418): "There are, however, several *observed facts* which need an explanation, since they seem rather to upset this theory." Unfortunately, this caution was not extended to the more widely circulated article in Newton's 'Dictionary of Birds,' which is marred by several faults—obvious enough to the thinking reader or the original observer, but likely to be overlooked by the general ornithologist. In the earlier paper a diagram of a "prismatic" feather is properly termed "hypothetical," but in the 'Dictionary' article the figure is reproduced above the inexcusable title, "Diagrammatic Section through the Barb of a Metallic Feather."

I have examined some hundreds of sections of metallic feathers under the microscope, and have never seen anything even remotely resembling this figure; and it should be obvious that, even if these prismatic layers did exist, their spectra would be projected inwards and so be quite invisible. Too much stress is laid on the assumption that these metallic colours are always those of the spectrum; yet in the eyed feather of a Peacock's train we can easily isolate sage green, raw sienna, burnt sienna (I use these well-known names advisedly), and other impure tints. It will thus be seen that the objections to the "prismatic theory" are very great: (1) the prisms have never been seen; (2) if they did exist, their spectra, according to the laws governing the path of light through a prism, would be invisible; and (3) other colours besides pure prismatic colours are conspicuous on many metallic feathers.

The true explanation is that the colours are *thin plate* or interference colours. This is no new discovery, and the fact seems to have been accepted without question by physicists for

many years; but the first discussion by an English-speaking ornithologist is that by Mr. J. Amory Jefferies in the 'Bulletin' of the Nuttall Ornithological Club (vol. vii. 1882, pp. 123-135). In 1895 B. Walter discussed the interference colours of feathers in 'Die Oberflächen oder Schiller-Farben,' and Prof. Victor



FEATHER FROM THE NECK OF STARLING.

The sketches were made by transmitted light from a purple hackle taken from the neck of a Starling, but, so far as I have been able to discover, there is not even the faintest difference in microscopical appearance between a green and a purple feather, and this is also the case when feathers have been treated with caustic potash, and altered in colour. The metallic effects are produced only by the specially modified barbules (figs. c and d). In figs. A and B their distribution is indicated by the heavier shading. The line sketch does not give the happiest idea of the appearance of the pigmented segments. Viewed under the microscope these have almost the exact appearance of tiny panels of polished oak or teak. They are deep brown in colour, and somewhat transparent, but the outer sheath is perfectly colourless and quite transparent. In the Starling these segments are by no means "overlapping compartments," and I have shown their form in figs. E (a transverse section) and F, which is a longitudinal section taken along the heavy black line on D.

I see no reason to doubt that the brown centres to each segment are nothing but pigmented areas, for we get the same appearances in tracing the commencement of the pigmented parts on the rachis of the feather, and the granular structure is confined to the dark central layer, and not, I think, to the outer transparent sheath. The changing tints of the Starling are thus due to the glossy segments of the barbules, and some readers may be interested to know the result of a calculation as to the number of facets visible on the living bird: there are between 45,000,000 and 70,000,000.

Fatio, in his interesting and suggestive paper on "Des Diverses Modifications dans les Formes et la Coloration des Plumes" ('Mémoires' Soc. Phys. et H. N. de Genève, xviii. 1866), quotes briefly other Continental authors who have held this theory of thin plate colours. Mr. C. E. Benham has been good enough to put me on the track of work by the late Mr. Lewis Wright, an interesting writer on the science of colour and light, and far better known as an expert on the economical aspects of the Common Fowl; but, although I have not been successful in seeing any long study of metallic feathers, he was clearly a believer in the colour being due to thin plates.

Many insects and molluscs exhibit interference colours. The shell of *Haliotis* gives wonderful effects, and responds to light in exactly the same way as does the plumage of the Humming Bird (see Dr. Gadow's diagram of "Positions for viewing Prismatic Feathers," P. Z. S., 1882). In the case of the shell it is easy to demonstrate, by the simple test of using alternately transmitted and reflected light on a minute flake under the microscope, that the colours are really due to thin plates and not to prisms. Quite recently (cf. 'Nature,' May 17th, 1912, p. 272) it has been proved that the iridescent colours of insects are due beyond any question to thin plates, and may be altered by the application of pressure.

Perhaps I might digress a moment to state that "thin plate" colours are produced by the action of thin films of any transparent substances on ordinary light. Speaking roughly, we only get these colours when the thickness of the film does not exceed $\cdot 000015$ of an inch or thereabouts, and every alteration in thickness alters the colour of the light reflected or transmitted. A simple experiment is to drop a minute quantity of turpentine on the surface of warm water, and then observe the changes of tint as the film spreads and evaporates. When we hold the water in a shallow black japanned tray the effects are wonderfully brilliant, and everybody must have noticed the vivid colours even on patches of oil in wet streets. It is wrong to call these colours "prismatic." They have nothing whatever to do with prisms, and, moreover, we get tints that are unknown in the spectrum. As a rule, the brilliant colours alone catch the ordinary eye, but a moment's attention will show the presence

of zones of browns, dull greens, reddish whites, &c. The exact relation between each colour and the thickness of the film has been ascertained in glass, water, and other substances, but it is not known in the case of the ceratin of feathers.

The difficulties attending the microscopical examination of feathers are very great. In spite of the most careful methods of imbedding and cutting, the sections of metallic feathers exhibit little of value. It is impossible to learn the nature or the extent of the transparent outer sheath, but stained and oblique sections show that it is actually present. I have only discovered one way of demonstrating the true nature of metallic feathers, and that is by the use of solutions of caustic potash. This is a solvent of ceratin, and by it we can remove a portion of the thin outer film, and as each particular colour depends upon a certain thickness of the layer, the general tint of the feather is affected at once by the potash, and we get some illuminating results from our experiments.

The comparatively dull colours of the Starling prevent it being a convenient subject, and for experimental purposes I have found other birds more suitable. Peacock feathers are admirable, as are those of Ducks, exotic Pigeons, or Humming Birds; and by the exercise of ordinary caution I have turned green feathers to brown and red, red to green, and so on. In most instances these changed colours are permanent when the feathers are dried, and a Humming Bird with an area of golden green in the middle of a specific ruby patch, or a tail-feather beautifully green where it should be violet, is well worth the trouble taken in its metamorphosis.

In the Starling the potash removes the lustre of green feathers, and changes purple feathers into green. Those who have not made the acquaintance of the wide range of thin plate colours need to be warned that this does not *quite* prove that the critical layer of ceratin is thicker in purple feathers than it is in green, but for our present purposes we can assume that it is so. Thus it would be possible, in theory, to change a specimen of *Sturnus menzbieri* into typical *S. vulgaris*, but in practice this would be impossible, unless we treated the plumage feather by feather. Here we have an illustration of the dangers that attend the student who attaches too much importance to colour

in questions of the relationships of birds. The difference in colour between the extreme *S. menzbieri* and *S. vulgaris* seems enormous, yet when we inquire into the source of these tints we learn that the only difference lies in the thickness of the transparent outer layer on certain parts of certain feathers, and at the outside this difference cannot be more than one fifty-thousandth part of an inch, and is probably much less.

In certain birds these metallic feathers are variable to some extent. I recollect once noting this in examining the purple specula of a batch of male Pintails. Often we find metallic colours appearing more or less sporadically in certain birds—for example, Ruff, Common Snipe, or even Red Grouse. This is easily explained by the theory of thin plate colours, which depend upon the simplest possible structures, but the phenomenon would be inexplicable to one who believed that metallic feathers owed their lustre to an elaborate system of prisms.

It is not then surprising to learn that Dr. Sharpe failed to reduce the chaos of our forms of Starlings by a study of their colours. Really one is justified in discussing the possibility of *S. menzbieri* leaving Siberia in its typical form, and arriving in England as the green-headed *S. vulgaris* merely through the wear and tear of the journey. Fatio, working along quite different lines, attempts to show how this is possible, and with the Starling; and I have myself tried the plan of rubbing the feathers with a pad of blotting-paper, in an attempt to wear down the colour. The best way is to cover half the feather with a piece of thin tough paper, so that the worn part may be compared later with the protected part. There is certainly a change of colour, and one in the right direction—from purple to green, but I must confess that I cannot hold the experiment to be free from the chances of error, nor productive of unequivocal results, owing to the fact that the feather presents not a flat surface, but a series of tiny curved facets.

The longer we live the more conscious we are of our ignorance of the real meanings of bird coloration. Mere questions of *values*, as discussed by that sagacious and keen-witted American, Mr. A. H. Thayer, may be solved, as he has worked, by accurate observation; but when we come to *colour*, we are at sea immediately. Years ago Dr. Waelchli demonstrated that some birds

(Finch, Pigeon, Common Fowl—possibly all birds) are colour-blind to blue. I have not been able to consult the original paper ('Onderz. Phys. Lab. Utrecht,' 1881, vi. pp. 297-314), and know only of his careful work with the micro-spectroscope on the retina through an article by T. Brudenell Carter (*cf.* 'Nature, May 15th, 1890, pp. 55-61; and 'Smithsonian Report,' 1890, pp. 687-704). How many ornithological students have stopped to consider this question of colour-blindness in birds? * Romanes has shown that some at least of the higher Apes are colour-blind, and it is comparatively a modern discovery that many men are so afflicted. The writer of a well-known work dealing largely with the colours of birds makes one statement that is so much at variance with my own experience that I cannot avoid thinking one of us must be abnormal; and this does not help one to accept with any confidence the lively speculations made in the past by those who have written on the æsthetic tastes of birds.

The inside of a pearly shell is quite as beautiful as the lustre of a Starling, and the same colours are repeated in greater brilliance when a drop of oil spreads on still water. In two of these cases we can agree that the beauty is useless—and can we not think that the beauty of a Starling or a Humming Bird is useless also? The actual polish of the feathers certainly repels water, and is so far useful, and perhaps we can ascribe the colour to the fact that the feather has a sort of reservoir of new surfaces, and that when one surface becomes worn and roughened another is ready to take its place, in exactly the manner in which we use a sketching or a scribbling block. Here we should have in a reversed form the changes that lend the colour to the growing *Haliotis* shell, where the lining is produced in thin layers. Of course this is pure speculation, and I should not like to think that it would be accepted as anything else.

Like most other common birds, the Starling is well worth

* In spring the House-Sparrow frequently does much damage to crocuses in our gardens. The blooms are destroyed, but, apparently, not eaten, and many people have remarked that the yellow crocuses are the chief sufferers. Indeed, I have been informed that Sparrows *never* touch purple flowers. This is not correct, for I have seen them destroy the purple varieties of crocus; but there is no question that the yellow kinds are far and away the worst sufferers. This quite agrees with Waelchli's investigations on the structure of the "rods and cones" of the retina.

intimate study. We owe it to those who are to follow us that we should put on record any points in which it may be undergoing change. Colour is not, I think, one of these, and I have added the latter part of the present paper in the hope that it may prevent other students attaching too much importance to the extremely thin layer of ceratin on which the tints of the bird depend. To urge the chromatic stability of such species as *S. indicus* as an objection seems illogical, for the birds are living under far different conditions. To me it seems that the colours of the genus are instable, but the points of psychology appear to be less subject to change and more eloquent of past history, and in this light it becomes more important to know whether a bird does or does not perch on sheep than to learn the colour (and in this the structure) of its plumage. Indeed, the mind and habits of the Starling might well be investigated along several other avenues—its mimetic song, polyandry, the theories of the "psychology of crowds" as applied to aerial evolutions. All these have some bearing on its increase, and so, through agriculture, on the larger problems of human life.

SOME NOTES ON THE NESTING OF THE TAWNY OWL (*SYRNIUM ALUCO*).

BY J. STEELE ELLIOTT.

May 10th.—8 p.m.: A Tawny Owl hooting freely during the daylight in a small plantation at the back of my house which adjoins the Wyre Forest.

11th.—7.30 p.m.: Three young, about a fortnight old, found inside a hollow apple-tree in my orchard; the tree some thirty yards distant from the plantation whence I watched the Owl hooting last night. The female was in the hole with the young, and as she refused to leave by either of the two entrances, I was able to place marking-rings on both her and her young. One pellet only, containing the remains of a rat and that quite recently ejected, was in the nesting-hole, and from its size ejected by the adult bird. No trace of any food in the nest. 8.15 p.m.: The male flew out of the plantation to one of the orchard trees, but did not hoot. I watched the nest until 9.20 p.m., when it was too dark to make further observation from a distance, so I visited the nest again to make sure that the female was still there. At 10.35 p.m., whilst standing on a short ladder to feel into the nest, the entrance of which is some eight feet from the ground, and the hollow eighteen inches deep, I was struck a severe blow on the back of the neck by the male bird; being taken unawares (although I have experienced a similar attack before when climbing up a tree to replace a young one that had fallen from the nesting-hole) I jumped to the ground and pulled my coat over my head just in time to ward off a second attack. Lighting a candle prevented my being further molested, and I was then able to satisfy myself that the hen bird was still with the young.

12th.—10.30 a.m.: No remains of any food or pellets in the nesting-hole. The removal of pellets from their nesting quarters

by this Owl seems to be an invariable rule, so unlike the Barn Owl, where a large accumulation remains.

13th.—7 a.m.: Hind-quarters of young rabbit in nest. 6.30 p.m.: no trace of any food remains. Two pellets of Tawny Owl taken from the roosting-place of another pair placed in the nest. 8 p.m.: the male bird being mobbed by small birds in the plantation. 9 p.m.: female on nest. 12 midnight: female still in nesting-hole with young, and one of the pellets placed in nest removed.

14th.—7 a.m.: No trace of any food remains. A portion of one pellet placed in nest by me not yet removed, probably the young ones had pulled it into parts. 9.30 p.m.: male bird heard hooting loudly near at hand, and visiting the nest at 10 p.m. I found it contained a half-grown rat recently killed, as it was still quite warm and partly eaten.

Although I constantly hear the male bird hooting loudly at a considerable distance away, it is very rarely that he hoots close at home.

15th.—7 a.m.: No remains of rat or other food in nest, and all portions of pellets also removed. One young one taken from nest and placed in a basket for the day. 7 p.m.: young one has ejected pellet in the interval; it contained some remains of the rat, all the larger bones, including the skull, were fractured. The skull was entire when examined in the nest the previous night. To-night is damp and cold, and the mother is brooding over her young with outstretched wings.

16th.—7 a.m.: No trace of any food in nest. A young one again removed. 6 p.m.: no pellet as yet cast by young one in basket. 8 p.m.: a pellet now in the basket. Pellet only contained a few bones, mostly fur.

The cleanliness of their nesting quarters puzzles me considerably. It is very rarely that any excrement or pellets are found in the hole at any time of the day or night. The young kept by me voided about three times during twelve hours and cast a pellet in the evening. There seems no alternative but that the fæces and pellets are either withheld until the nest is visited by the male bird, or those of the young swallowed in the meantime by the female. Remains of food, such as the larger bones, skulls, &c., which cannot be fractured and swallowed, are

removed to some distance. I have never found any traces of food pellets or excrement near the nesting quarters.

17th.—7 a.m.: No traces of food in nest.

20th.—7 p.m.: The first time I have visited the nest and found the female absent from her young. A pellet placed in nest on previous visit has been removed. A freshly ejected pellet, containing a few small bones and fur, also legs and elytra of dung beetle and cockchafer. 8.50 p.m.: no additional pellets in nest. Although still quite light, I was attacked by one of the old birds and struck on my back, a second swoop being warded off. I watched nest at a distance until 9.20 p.m.; one of the old birds had called frequently from a pear-tree during the earlier part of my observation, and after remaining for some time I concluded the old bird had flown away so I approached the nest again for further investigation. I was under the impression I was keeping a sharp look-out, when, without any warning, I felt a terrific blow on the side of my face, and I was partly dazed for the moment. The Owl had torn my ear and side of my face with her talons, and my hearing was affected for a day or so as the result of the blow. From the vicious swoop made I came to the conclusion that it was the female that had now attacked me, and I made a note at the time, wondering how the bird escaped injuring herself by the contact. The impetus with which the swoop is made is sufficient to knock the life out of a rat or similar prey.

21st.—6 p.m.: No pellets or food in nest. One of the old birds roosting in plantation within thirty yards of nest.

The male bird appears to roost throughout the nesting period in close proximity to the young, the female remaining with the young throughout the day, and probably practically the whole of the night as well, until the young are some three weeks old, and then seldom leaving the nest unguarded until the young are on the wing, thus leaving the male bird free to provide food both for female and its young.

23rd.—7 a.m.: Rained all night. One young one has fallen from the nesting-hole and found at foot of tree and replaced. The young are now old enough to clamber upwards to the entrance. No food remains in nest.

24th.—6.45 a.m.: The above young one dead in nest and

removed, no portion of it had been eaten. Hind portion of one and the back leg of another young rabbit, legs and tail of a Starling, and portion of Long-tailed Field Mouse in the nest. I did not contemplate being attacked by the old bird during the bright sunshine until this morning, when I received another blow on my collar.

I am of opinion that birds of prey seldom hunt for food in the immediate vicinity of their nest, and these observations tend to confirm this belief. In close proximity to the nest I have a considerable number of cross-bred white rabbits, and although their numerous young ones must be a conspicuous prey for Owls, none of their remains are ever found in nest or in the pellets.

31st.—7 a.m.: One of the old birds flew from plantation to apple-tree next to nesting-tree but did not attack. Amongst part of the refuse taken from the bottom of nesting-hole are the feathers of a Mistle-Thrush, some portions of pellets containing the legs and wing-cases of several cockchafers, and one or more dung beetles. Some parts of excreta are now found in the nest. 7.30 p.m.: whilst standing on the ladder to inspect the nest, one of the old birds immediately flew from the plantation direct at me. I held out the straw hat I was wearing at arm's length for protection; the force with which the Owl struck the hat stunned the bird, and she fell motionless to the ground some few feet distant beyond the tree. It proved to be the hen bird, as I had anticipated. In striking the hat she had forced it from my grasp, and in so doing considerably bent the double straw brim and driven her beak right into the angle of the crown, which was evidently the cause of her disaster. In a quarter of an hour she again showed signs of life, and in a few minutes after she had recovered sufficiently to fly from my house to the top of a beehive in my garden some twenty yards distant. Here she remained another fifteen minutes, allowing herself in the meantime to be freely mobbed by the small birds until a Mistle-Thrush, with more daring than all the other birds, gave her a severe buffetting, when she once again sought the plantation.

June 1st.—6.45 a.m.: As a protection from further attack I took an open umbrella with me to the nest. But in vain, for the old bird attacked me in exactly the same way as last night,

and ripped the umbrella cover right across. Remains of a rat in nest. Four large pellets put into nest the previous night have all been removed.

2nd.—9 a.m.: One young one sitting outside at entrance to hole. Owl attacks again; in this instance I waved the umbrella round, endeavouring to scare her, but without success, and she ripped it this time across the side.

3rd.—7 a.m.: I took a second person with me to the nest. The Owl was seen but did not attack. One young had left the nest, and was perched in apple-tree close by.

4th.—7 p.m.: The nest empty. One young perched in tree near at hand. Upon an examination of the remains on the floor of the nest I found the leg of a Starling, several pin-feathers from wing of young Jay, four fractured leg-bones of rats, two pairs of lower jaws of voles, and few more remains of cockchafer and dung beetles, a few small portions of pellets, and a small amount of excreta.

16th.—Both young still continue to roost in the plantation. Each night at dusk they call vociferously for food. To-night, at 9.15 p.m., they were crying out one on either side of the valley, eventually the one crossing over to the far side to join the other. Soon afterwards one of the parent birds hooted in reply to the cry from the opposite side, when both young immediately recrossed in answer to the call.

22nd.—10 p.m.: At the time of closing these notes for publication the young may still be heard uttering their monotonous cry for food.

30th.—Up to this date the two young Owls, with at least one of the old birds, always somewhere near at hand, have continued to spend the daytime in the plantation next the orchard.

ON THE FURZE WARBLERS OF FRANCE.

BY COLLINGWOOD INGRAM.

DURING a recent excursion through Western France I was able to collect a small series of Furze Warblers. Having compared these with specimens in various French museums and with those in the British Museum, I have come to the conclusion that the form found in the soft climate of Western France (and probably down the Atlantic coast as far as Spain) is intermediate between the British *Sylvia undata dartfordiensis*, Lath. and the typical *Sylvia undata* from Provence, &c. In my opinion, therefore, Cretté de Palluel's name *aremoricus* ('Ornis' x., p. 42) should be retained for this western race.

We will compare the upper surface first. All the English specimens I have examined have these parts hair-brown, at all seasons darker and browner than in *S. u. aremoricus*. Admittedly the latter bird, even in worn plumage, has the back (and, to a lesser extent, the head) washed with brownish, but this colour is constantly lighter and of a "greyer" shade. (It must be remembered that the brown coloration is always more pronounced in the freshly acquired plumage of autumn and winter.) During the summer the typical *S. undata* has the crown and back almost uniform slaty-grey, with only the faintest tinge of brown on the mantle. The head is almost invariably of a clearer and more slaty hue. Even at a distance this gives the bird a noticeably paler and greyer appearance.

We will now take the under surface. In the English *S. u. dartfordiensis* the feathers on the throat and upper breast are never so distinctly tipped with white, and as the season advances these marks disappear almost entirely, even from the throat. The vinous-chestnut seems to cover a larger area, and is darker, and of a richer and much more rusty hue. *S. u. aremoricus* only differs from this bird by having the under parts slightly less rusty in colour. The throat-feathers in summer usually have very small, but distinct, white tips.

S. undata has the under surface conspicuously paler and more vinous, with a greyish wash on the flanks, and the throat-feathers are always more distinctly tipped with white. In winter the feathers on the under parts are heavily bordered with white.

The distribution of the various races appears to be roughly as follows:—

Sylvia undata (Boddaert). Northern shores of the Mediterranean basin, east to Italy.

S. undata aremoricus, de Palluel. The Atlantic coasts from Finistère and North-west France to Spain (?) (Portuguese specimens seem to agree perfectly with those from Western France).

S. undata toni, Hartert. North-west Africa. (A slightly smaller race.)

S. undata dartfordiensis, Latham. Southern England.

THE BIRDS OF THAT PORTION OF THE NORTH-EAST COAST BETWEEN TYNEMOUTH AND SEATON SLUICE, NORTHUMBERLAND.

By J. M. CHARLTON.

ADDENDA ET CORRIGENDA.

ADDITIONAL SPECIES.

LESSER WHITETHROAT (*Sylvia curruca*).—I have examined a male shot in Holywell Dene, May 3rd, 1905, by Mr. J. Proudlock.

BLACKCAP (*Sylvia atricapilla*).—An adult female in Mr. Proudlock's possession shot in Holywell Dene, spring 1896; an adult male shot, 1892, of which he has a drawing.

GARDEN-WARBLER (*Sylvia hortensis*).—Occurs regularly in spring and nests have been found in Holywell, the eggs of which I have examined.

WOOD-WARBLER (*Phylloscopus sibilatrix*).—Occurs sparingly on migration; one or two pairs nest at irregular intervals in Delaval Hall Avenue.

GRASSHOPPER-WARBLER (*Locustella naevia*).—Occurs regularly in late spring; a few pairs breed, and I have examined eggs taken in Holywell Dene.

COAL-TITMOUSE (*Parus ater*).—Of infrequent occurrence in Holywell during winter.

HAWFINCH (*Coccothraustes vulgaris*).—A pair observed closely by Mr. Proudlock in Holywell, spring 1898.

SISKIN (*Carduelis spinus*).—A winter visitant; occurring some years, but others entirely absent.

MEALY REDPOLL (*Linota linaria*).—Irregularly occurs on coast in varying numbers; abundant in 1910.

TWITE (*Linota flavirostris*).—Sometimes captured in winter with other finches by limed twigs of pitmen.

[LITTLE BUNTING (*Emberiza pusilla*)].—On Dec. 8th, 1911, I observed a bird within six yards during a foggy evening on Cullercoats cliffs, which corresponded exactly with the description of the immature of this species.

TENGMALM'S OWL (*Nyctala tengmalmi*).—For my account of a specimen "winged" in Holywell Dene, Jan. 1912, see 'British Birds,' June 1912. It was caged and is still alive.

[LITTLE OWL (*Athene noctua*)].—I notified the occurrence of a possibly genuine wild individual picked up in Whitley, Nov. 1911, in 'British Birds,' Feb. 1912.

HEN-HARRIER (*Circus cyaneus*).—An immature female shot in Holywell Dene, Jan. 24th, 1912 ['British Birds,' March, 1912].

BERNACLE-GOOSE (*Bernicla leucopsis*).—Two shot by Mr. Amos Winslip, St. Mary's Island, winter 1882-3. Another by Mr. J. Mitchison, same locality.

STONE-CURLEW (*Edicnemus scolopax*).—Two recorded by Mr. G. Bolam as observed, and one of them, an adult, shot Jan. 1st, 1897, near Earsdon.

[BLACK-WINGED STILT (*Himantopus candidus*)].—One believed to have been seen by Mr. Proudlock near Holywell, spring 1889. It was by an inland pond, and was clearly observed both before and when in flight.

GREAT SNIPE (*Gallinago major*).—One shot in fields near Holywell, 1900. Examined and preserved by Mr. Proudlock, who noted characteristics.

BLACK-TAILED GODWIT (*Limosa ægocephala*).—On Sept. 8th, 1869, Mr. R. Duncan shot two immature birds from a flock of four flying north at St. Mary's Island.

[IVORY GULL (*Pagophila eburnea*)].—A specimen in the late Mr. T. Thompson's collection said to have been shot off the mouth of Tyne, but that gentlemen and others did not think it authentic.

[BRÜNNICH'S GUILLEMOT (*Uria bruennichi*)].—Mr. G. Bolam records that at one time the late Mr. Howse suspected one or more to have been shot off the Tyne, but could not trace them.

Further investigations have made the following notes necessary:—

RING OUZEL.—Probably regular if rarely observed migrant. I have several other records.

WHINCHAT.—Still breeds sparingly in favourable localities. Have examined local eggs.

REDSTART.—Breeds in stone walls around Holywell.

BLACK REDSTART.—A male shot near Delaval Hall, winter 1897.

CHIFFCHAFF.—In his book on 'Birds of Northumberland and

the Eastern Borders,' Mr. George Bolam has entirely misrepresented my remarks in this paper, when he says that I mention this species as scarce in Northumberland; it is obvious that I merely stated that it was rare *in winter*.

SEDGE-WARBLER.—A few pairs breed regularly in Holywell Dene; I have examined unblown local clutches.

HEDGE-SPARROW.—Mr. Proudlock has a fine cream-coloured specimen shot in Holywell about 1892.

GREAT TIT.—Nests have been found at Holywell; I have seen eggs.

MARSH-TIT.—Several more occurrences.

TREE-CREEPER.—A few more occurrences.

PIED WAGTAIL.—A fairly common breeding species.

YELLOW WAGTAIL.—Nests found on several occasions in the past few years in cornfields around Holywell by Messrs. Hodgson and Proudlock; I have seen the eggs.

GREY WAGTAIL.—Two nests recorded, Holywell Dene, 1904, 1907; eggs examined.

TREE-PIBIT.—I have examined eggs from a nest in Holywell, taken 1906.

GREAT GREY SHRIKE.—Several more definite occurrences; one in late spring, 1912.

WAXWING.—Four killed at one shot, Holywell Dene, winter of 1904. Another, winter 1909.

PIED FLYCATCHER.—Evidently regular spring migrant in small numbers.

HOUSE MARTIN.—A pure albino shot, St. Mary's Island, 1894.

LESSER REDPOLL.—Nests have been found in Holywell Dene. I have examined clutches. Seldom occurs in autumn or winter.

REED-BUNTING.—A local name is "Rasher" Bunting; the vernacular for reed.

ROSE-COLOURED PASTOR.—Mr. G. Bolam states that at least one has been killed at St. Mary's Island (in about the seventies).

SHORE-LARK.—Small flock seen passing south at Cullercoats, Oct. 30th, 1911 ('British Birds,' Feb. 1912).

GREAT SPOTTED WOODPECKER.—The second specimen recorded, on examination by Dr. N. F. Ticehurst proved to be of the Northern Continental form ('British Birds,' Dec. 1911).

HOOPOE.—One shot, Hartley Pans, autumn 1902.

CUCKOO.—Mr. Proudlock has almost yearly found a young bird in Holywell Dene.

BARN-OWL.—Definite proof of nesting in Delaval Hall. All specimens examined of white-breasted form.

ROUGH-LEGGED BUZZARD.—Can, at present time, be termed a regular migrant ('British Birds,' Feb. 1912).

HONEY-BUZZARD.—A fine male shot at Holywell about 1904, in possession of Mr. James Elder; a very dark bird.

BRENT GOOSE.—In a note in 'British Birds,' May, 1912, I have given proof of the northward migration to Holy Island in Jan. and Feb. 1912.

PALLAS'S SAND-GROUSE.—Two more shot from flock at Island on May 20th, 1888, by Mr. J. Smith. They were locally known as "Pintails."

QUAIL.—One or two heard fairly regularly each spring.

DOTTEREL.—I have three or four more records within the last ten years.

SNIBE.—Has bred on one authentic occasion in Holywell Dene.

DUNLIN.—Regular visitant in autumn and winter.

LITTLE STINT.—Mr. Duncan and his father shot three from a flock of fifteen at St. Mary's Island, Sept. 1855.

REDSHANK.—Has bred on several occasions in the vicinity of Holywell.

BLACK-HEADED GULL.—Account of movements of flies and gulls, 'British Birds,' March, 1912.

GLAUCOUS GULL.—Immature, observed by myself in heavy storm, Nov. 27th, 1911, at St. Mary's Island. Others have occurred. Local name "Tallow" Gull.

ICELAND GULL.—Immature closely observed by H. V. Charlton, Jan. 31st, 1912, at Tynemouth.

LITTLE AUK.—Great passage of this species along the entire coast, Jan. 1912, recorded in 'British Birds,' March, 1912, and in 'Zoologist.'

GREAT CRESTED GREBE.—Adult winter plumage, shot 1884, St. Mary's Island.

FULMAR.—An adult male brought to me Nov. 1st, 1911, caught on sands at Whitley and kept alive for a day.

My thanks are due to Mr. John Proudlock, Seaton Delaval, for many notes.

A SEASON WITH THE BIRDS OF ANGLESEY AND NORTH CARNARVONSHIRE.

By T. OWEN.

THE 21st day of February dawns at last, when it has been proposed that we should visit the mountains to observe our friend the Raven. The Thrush has been pouring forth its sweet music from the early morn, and the Great Tit, with its saw-rasping note, has been active in the trees about. The day does not look very promising, but all is well up to 2 p.m., and we lead forth our bicycles into the roadway, and soon are riding towards our destination, eleven miles away.

On the way we see a flock of Sea-gulls which have just left off following the ploughman at his work, and are flying off probably to the now ebbing tide to gorge themselves furthermore, much to the relief, we suppose, of both the man and horses. A Chaffinch, busily feeding on the roadway, waits until the front wheel of one of our machines is upon it, and nearly becomes entangled in the spokes, but somehow it manages to flit on to a hedge, uttering a sweet "pink, pink." After riding for a couple of miles or so in this mountainous district we come to a good-sized lake, on which we perceive six Wigeon, their chestnut-coloured heads being conspicuous a long way off. We still have about three miles to cover before we come to the crag where a pair of Ravens are known by us to nest annually, but we soon arrive there and dismount.

Leaving our bicycles, we push forwards, and soon are climbing over the boulders and heather-clad slopes, stopping now and again to recover our breath, and meanwhile cast our eyes in various directions in the hope of seeing the Ravens. As we proceed we are suddenly attracted by a loud "kak, kak, kak" above us, and, looking up, we behold a Peregrine Falcon that has just left its look-out ledge, and is now flying spirally upwards. It swoops once again towards the ledge, and, giving

another call, it dashes off into the valley at such a pace that in a few seconds our eyes can no longer see the speck into which it has diminished. The next bird to attract our attention is the Wren, which we first of all hear and then see at a good distance off. How such a frail-looking bird as this braves the winter at a height of over two thousand feet above the sea-level excites our wonder.

After a somewhat stiff climb we are at length able to look down at the nest of the Ravens, for the wary birds have a well-chosen site, which can only be gained by the aid of ropes and skilful manœuvring on the part of the climber. Up to now no sign has been seen of the birds themselves—probably they are foraging the country around—but the nest has been seen to, as we can tell from the fresh-looking branches that are piled upon it. After some time, and just as we are about to leave, there falls upon our ears the sound that we have longed for, the croak of the Raven, and, looking out into the valley, we observe both the birds. But there is a third bird present; it is the Peregrine again, which follows them like a flash—now it is above them, and suddenly, like a thunderbolt, it falls—but the Ravens merely seem to give a half-turn of their wings, and the Peregrine goes on into space. However, it soon checks its downward rush, and immediately gains above them again to repeat its actions. This proceeds for a time until the Ravens settle down on a crag, and then the Peregrine is obliged to give up its “sport.”

On reaching the bottom of the mountain again we meet the keeper, who, with his gun under his arm, is looking for the track of a Fox that has been reported to him. We at once become inquisitive as to his knowledge of the birds of the locality, and are much delighted at the information that he gives us. When we asked him whether he tried to shoot the Ravens and Falcons, he replied that he did not, as they caused his charges no harm.

On February 24th we visit another locality up in the mountains in the hope of coming across another haunt of the Raven. Not much of bird-life is seen by us on the way, and the first bird seen that is worthy of mention is a Red Grouse, which we flush from the heather on the mountain side. On nearing the top of

the mountain attention is drawn to a large bird sailing in view overhead, and, from its rounded wings and tail and its circling flight, we know that it is a Buzzard. However, this afternoon no Raven flies forth from the many crags that we search to challenge us with its "croak, croak."

March 6th.—Snow mantles the mountain-tops as we set out to the Raven's haunt. When we come to the large lake we notice that the Wigeon are still there, and also, on a large boulder on the opposite shore, is a Cormorant. Coming at last to the nesting-site of the Corbies, we keep on the look-out for their dark forms as they would fly from the crag, but they do not appear, neither does the Peregrine greet us with its call as we start on our climb up. A little wool has been added to the nest, so that very soon now it ought to contain the first egg, but it was March 25th, 1911, when we visited the nest and found it to contain eggs. The Ravens at last appear overhead, and after bellowing out their croak they fly spirally upwards to a great height, and, after watching this fine aerial performance, we descend into the valley, where six Stonechats and a small flock of Plover are seen.

16th.—Owing to the state of the weather we decide to-day to go only for a short cycle ride, our chosen path taking us past a large rookery, and here we stop for a while. Some of the Rooks are already sitting, and others are busily engaged in getting material. Between the lot of them there is a terrific din, and here and there a battle-royal exists between those who prefer to steal material from the nests of others and the owners thereof. From the rookery we cycle on until we come to a small pond, where a Waterhen with its bobbing head and a pair of Wild Duck seem to be the only occupants. The piping note of a Dipper next attracts our attention, and then we see the bird itself as it darts swiftly over the pond.

20th.—On visiting the Raven's haunt to-day we find that the nest is in the same state as when last seen by us, and consequently we are greatly perplexed, for by now the nest should contain eggs. As we believe that there is but little chance of harm having befallen the Ravens, we come to the conclusion that they must have built a new nest elsewhere. A search among some of the rocks does not disclose it, and at length we

are obliged to give it up, but at the same time we determine to come here again and search further.

When we are down in the valley our attention is drawn by a mewling cry, and on looking up we see a Buzzard sailing gracefully along with motionless wings. Suddenly it throws itself forwards, and with wings drawn back it cleaves downwards through the air to earth. It seems exactly as if it was going to dash against the ground, but, no! for when it is but a few yards above it, it spreads its wings and tail out again, and then glides for about two hundred yards, rising once more to join another Buzzard that has appeared on the scene.

23rd.—To-day we walk along the bank of the Ogwen River, and see a Grey Wagtail and a few Dippers, but we do not find a nest of the latter species built as is usual against a part of a bridge across the river. In a plantation of small firs a Thrush's and a Blackbird's nest are found, both containing three eggs.

27th.—Permission having been obtained, we to-day spend the afternoon in Penrhyn Park. Taking ourselves to a corner of the park where there is a heronry, we are, on arriving there, greatly disappointed to see only a few nests, whereas last year there were more than a dozen. Of the few nests only two seem to be inhabited, for on our approach a Heron gets up from each, and these are built at the top of two exceedingly tall trees. Owing to the thickness of them both, and the scarcity of branches near to the base, we are unable to climb up and ascertain the contents of the nests. From the wall which bounds the park on the Menai Straits side we can see a few Redshanks wading in the mud by the Weir.

31st.—When out for a short walk about half a dozen Goldfinches are observed in a field.

The afternoon of April 3rd finds us cycling to Penmon, Anglesey. On the way we dismount, and, leaving our bicycles by the roadside, go into the adjacent wood to inspect a hole in an oak-tree, where we have been told a Tawny Owl nests annually. On climbing up to the hole a faint scrambling noise is heard inside, and presently two blue eyes peer out, and then the Owl wholly emerges and flies noiselessly away. A hand lowered down into the nesting-hole secures three eggs. These,

on being handled, at first give one the impression that they are the eggs of one of the hawk tribe, for they are profusely splashed with red. However, this is not due to there being a pigment present in the shell, for on wetting it quickly disappears, leaving a pure white surface. This colouring matter we find is the result of the eggs having been rolled about the bottom of the hole, which was lined with a substance of this colour.

Arriving at the Priory Woods, we begin to make a search, and soon we are attracted by a loud tapping noise. Stopping we make out the direction the noise proceeds from in order to see what we thought would be a Green Woodpecker, but what we behold is a beautiful pied bird—a Greater Spotted Woodpecker*—which we keep following for a little time. In this wood there is a rookery, and as we pass beneath the nests the Rooks become very noisy. A half-finished nest of a Tree-Sparrow is come across in a hole in an old tree—at least we presume that it will belong to a Tree-Sparrow, for a pair of this species have built in the hole for some seasons past.

Quitting the wood, we make for the common, where Meadow-Pipits abound, and Lapwings rise here and there, calling out their weird note; but although we search carefully for their eggs, we fail to discover any. When returning to our bicycles we keep alongside the wood, and perceive a Green Woodpecker.

Good Friday finds us once more in the haunt of the Raven. When we are about six miles distant from it, two Ravens are seen circling above a high crag, and finally drop on to it, but we do not stop to investigate.

On arriving at our known haunt we are right glad to see two Corbies flying about, and we hide ourselves behind a boulder to watch their movements. The two birds keep at a good distance from the crag, but at last one of them flies towards it, swoops

* Later, on consulting Forrest's 'Fauna of North Wales,' 1909, we found that the Greater Spotted Woodpecker was not recorded for Anglesey. On writing to Mr. Forrest to ascertain whether the species had been reported to him since the date of the publication of his book, he wrote back to say that it had not been, so that, to our knowledge, we have the pleasure of being the first to put it on record for Anglesey.

down on to a ledge, calling out a hoarse croak, and flying out again to its mate. After taking careful bearings of this ledge to enable us to know where to stop, we at once begin to climb up. The point is at length reached, and after some trouble one is able to look along the narrow ledge, where, to our joy, the new nest is found. However, it is not possible for us to look into the inside of it from this point, so that for this purpose we have to climb higher still. Then crawling along on all fours and running some risk, the edge of the precipice is thus gained, and a view of the inside of the nest obtained. It contains three young, as far as we can discern, which accounts for the behaviour of the two old Ravens when we approached the crag, and now they are wheeling close above our heads, croaking the whole time. While we are at this point we are attracted by the call of the Peregrine, and on looking up we see four of them keeping apart in pairs. Down in the valley, conspicuous by their white rumps, are a number of Wheatears, hopping swiftly from mound to mound as we approach them.

April 6th.—In the afternoon we walk up along the left bank of the River Cegin. Having been told of a Dipper's nest at a certain place where one was known to us last season, we, on coming to the spot, begin to search, and soon come across it, and find that it contains young. On proceeding along we perceive a Grey Wagtail as it flits by down stream with its undulating flight, and uttering a sharp "zisy." Further on up the river we come across another Dipper's nest, built against a steep mossy rock on the opposite bank.

Easter Monday.—Thinking of visiting another Raven's haunt that we knew of, and which needs a whole day to reach and return, we leave the town by the 7.50 a.m. train. Our journey by railway is only short, but before we arrive at the little station where we are to alight we see, when looking through the carriage-window, a brace of Partridges squatting low as the train rumbles past them. On alighting we deliver up our tickets to the stationmaster, who was the sole person on the little platform, and who bids us a pleasant walk. Passing a large rookery, where all the Rooks seem very busy, we enter into a narrow valley which is exceedingly well-wooded, and here we obtain a glimpse of a Sparrow-Hawk. A tramp

of three miles brings us to the first rock that we are to stop at. Here three years ago a pair of Buzzards nested and successfully reared off a brood of three young, but since then they have nested somewhere else in the same vicinity, for, although we have been unable to discover the new nest, the two old birds, together with their young, have been seen by us at the end of each season. The Buzzards are not about this morning, but we climb up to the old nest in order to see if there is any sign of their going to utilize it this spring, but it is in the same dilapidated state. No sooner than we reach level ground again it begins to rain, and we hurriedly seek for shelter. A shelter, however, we are unable to obtain, and in rushing about we frighten a Tawny Owl from its snooze in an ivy-clad tree. We determine to wait for an hour in the hope of it clearing up, but the hour is ended and still it pours, so we wend our way back, disappointed and uncomfortable in our wet clothes. On the way a Mistle-Thrush's nest with two eggs is found, and we also stop for a while to watch a gymnastic display afforded us by a couple of Long-tailed Tits in a small hawthorn.

10th.—We cycle to a wood not very far away from the town, where a Chiffchaff is seen and heard for the first time this season. After a long search for nests, the only one of interest that we find is a Long-tailed Tit's, which is built in a gorse-bush and is full of eggs. A Kestrel is also seen.

13th.—Another visit is paid to Penmon, and on arriving at the deer-enclosure we endeavour to find some Peewits' eggs, and in all we find about nine nests, all of which are empty, for the man who supplies the poultry dealer has been there before us in the early morn. A Carrion-Crow which appears overhead is at once chased away by the Peewits. After this we enter the Priory Wood, not very far off. In a hole that a Green Woodpecker had started to hack out last year, and the entrance to which had been enlarged with a knife, a Robin had built its nest, which contained five eggs. As one is in the act of climbing up to investigate a hole in a tree, and gripping on to a piece of bark in order to ascend, a big strip of the latter gives way and reveals to us a nest. This is a last year's structure of a Tree-Creeper, with one broken egg and two whole ones embedded in the feathers. A pair of Pied Wagtails are

seen sporting themselves at a pond. To-day two Swallows are observed.

20th.—We are unable to give this day wholly to the interest of bird-life. However, in riding along the narrow lanes we observe quite a number of Yellowhammers, Greenfinches, and a few Linnets, and also have the pleasure of hearing the Cuckoo for the first time this season.

24th.—This day again we are hindered from spending a whole afternoon with the birds, but at about 5 p.m. we take ourselves to a wood on the shore of the Menai Straits. Here we find many Blackbirds' and Thrushes' nests containing both eggs and young, and we notice that there are a few young Thrushes already on the wing. A pair of Bullfinches are seen, but they do not appear to have a nest at the place where they were disturbed.

26th.—When down by the Straits to-day a pair of Dunlin are seen, these being in summer plumage.

27th.—Having been informed that a pair of Mute Swans were nesting at a certain place in the county of Anglesey, we determined to cycle there on this date. Therefore, at 1 p.m., we start, and an hour and a half later we arrive at the lake, the only bird which we see on the way worthy of mention being a Sparrow-Hawk, which was flying low over the hedgerow. Leaving our bicycles we at once begin a detour of the lake, and as we proceed we disturb a few Redshanks from the water's edge. On approaching a part of the lake where some bulrushes are growing, we see a Swan resting on the shore, and on arriving nearer, it lazily stretches out one of its wings and, taking to the water, swims gracefully away. Reaching the swamp we look about and soon discover the object of our visit right in the centre of the bulrushes. When we try to get nearer to the nest we sink knee-deep into the mire, but at length we approach as near as we dare the sitting bird, which is now showing signs of anxiety and hisses. A few photographs of the Swan on its nest are taken, and then, as we are taking the camera away, an inquisitive farmer appears on the scene and demands to know what we are about; however, we soon set him at ease, and in turn become inquisitive ourselves as to the history of the Swans, but he is not able to tell us much. A little later we meet

an old gentleman who appears to be in charge of the fishing of the lake, and he tells us that the Swans have nested at the place for the last seven years to his recollection. Last year they had a brood of seven cygnets, and this year the nest contains eight eggs. He said that in winter the old birds frequently leave the lake, and he has known them once to have been away for nearly a month. Among the birds that frequent the lake, he tells



MUTE SWAN ON NEST. (Photo T. Owen.)

us, are a few pairs of Tufted Ducks, but we do not see them to-day.

May 1st.—To-day we visit the district round the old Buzzard's haunt. On the mountain side we see a Ring-Ouzel, and also obtain a fine view of a Kestrel that settles on a rock close to where we are resting. A loud cackling noise issues from somewhere below us, and after scanning about we at last see two Pheasants amongst the bracken, they being engaged in

combat. When we have descended again into the valley we find a Chaffinch's nest containing five eggs, and also come across two other empty ones of the same species. From close by a Green Woodpecker calls out its loud laughing note, and the other birds we see in going along include a pair of Tree-Pipits, Chiffchaffs, Wood-Wrens, and Willow-Wrens. At about 9.45 in the evening we hear the seven times repeated whistle of Whimbrel, as a flock of them pass overhead in a northerly direction.

4th.—We cycle to Castle Rock in Red Wharfe Bay, Anglesey, where Stock-Doves are known by us to breed. As we approach the precipitous side of the rock a Kestrel is seen to leave it, and a flock of Jackdaws that nest in the numerous holes start to fly around, "dawing" the whole time. A large number of Stock-Doves leave their nesting-holes, which we notice are nearly all at the top of the rock. When we reach a place where we can ascend we do so, keeping close to the edge when walking along. Some more Stock-Doves leave their nesting-holes, but only two of these are accessible, the one containing a single egg, and the other a couple of young a few days old. Coming to the place whence we had seen the Kestrel leave, we once more disturb it, but now we can look down and can distinguish its four ruddy eggs laid in a slight scratching on a grassy ledge. The same day we observe Swifts and hear the Corn-crake.

To be continued.)

NOTES AND QUERIES.

MAMMALIA.

Habits of the Common Squirrel.—In 'The Zoologist' (*ante*, p. 267) Mr. J. S. Huxley reported having noticed a Squirrel gnawing at a fallen antler of a Fallow-deer. He thought it interesting to know if others had noticed similar proclivities in the Squirrel; he believed the habit well known among certain other species, such as cows. May I be allowed to give the readers of 'The Zoologist' the following observations relating to Mr. Huxley's inquiries? In 1881 I saw in the Stuttgart Museum a piece of a deer's antler which was gnawed by the common European Squirrel. Mr. Du Chaillu called an African Squirrel (*Sciurus eborivorus*) the "Ivory-eater," and said that the animal shows a curious partiality for ivory, and that many tusks of Elephants are found with the marks of its teeth. Other rodents seem to be very fond of hard animal or other matter; for instance, Mr. Du Chaillu relates that the Porcupine of West Africa is said by the natives to feed sometimes on the tusks of the Elephant, and so on. I think that Mr. Siebe ('Der Zoologische Garten,' 1881, No. 3, p. 93) is right in supposing that Squirrels and other gnawing animals gnaw stones, shells, and other hard substances for the purpose of shortening the incisors.—(Dr.) F. A. JENTINK (Leyden Museum).

AVES.

A Lonely Sparrow.—A male Hedge-Sparrow (*Accentor modularis*) completed a nice little nest in the tangled growth of a roadside bank on July 2nd last, and apparently had not a mate to share his domestic happiness with him, but sat upon his hermitage, a nicely lined structure, for thirteen days. I passed this spot at Dulcote Village twice daily, and I believe the bird began to know me, for it would allow me to chatter to it and almost touch it before leaving the nest. On July 16th the surveyor's man trimmed the long growth which threatened to overhang the road, and on this date the Sparrow forsook its nest.—STANLEY LEWIS (Wells, Somerset).

Motacilla alba in Ireland.—The kindness of my old friend Captain Kirkwood, of Bartragh House, has again enabled me to record the

spring visit of the White Wagtails this season to their usual haunt on the island of Bartragh, Killala Bay. Their favourite haunt is a damp flat of short coarse pasture situated between the sandhills and the shore of the estuary, close to the fruit garden, and a small horse-pond outside the paddock-wall is probably the attraction, for it is the only water on the island available, except a small spring on the shore not frequented by the birds. Captain Kirkwood informed me that on April 25th a flock of fifteen or sixteen birds was first observed, which remained on the island for three days, until the gale of northerly wind that was blowing on their arrival had changed to the south-west, when they disappeared, and none were seen afterwards. These birds have now been observed regularly visiting Bartragh every season since 1898 (with the exception of 1907), and that omission may have been caused by the absence of Captain Kirkwood and his man from the island at the time of the birds' visit, which sometimes is only for two or three hours, altogether depending on the state of the weather. —ROBERT WARREN (Ardnaree, Monkstown, Co. Cork).

Note on *Caprimulgus europæus*.—In 'The Zoologist' for 1911 (p. 318) I recorded the finding of two young Nightjars on the sand near Southwold in July last, and ventured to suggest that the parent bird might possibly have moved her eggs and small young. But this year I found two nearly fresh eggs on the sand close to the same spot, so it would appear that for two years in succession this Nightjar made choice of a most unusual breeding-place, the more difficult to account for when there is a wood not far away, and an abundance of cover afforded by brake within a stone's throw.—JULIAN G. TUCK (Tostock Rectory, Bury St. Edmunds).

Absence of the Cuckoo.—June 17th is the latest date on which the Cuckoo was heard in this neighbourhood this year, for I fear we have heard it for the last time. Prior to this date Cuckoos were seen and heard on every side, sometimes three at once, but since June 17th the well-known note of this species has been very conspicuous by its absence; I have made inquiries amongst the country-folk, and they "have not heard the Cuckoo for some time." I ramble over field and fallow every day, and not only have I failed to hear a Cuckoo, but I have not seen one; I followed a bird some distance on July 4th, but it turned out to be a Kestrel. Towards the end of June I expect to hear less of its notes, also the faulty call, with two or three "cucks" to one "coo," but not its entire absence from us. A partial migration undoubtedly took place here from the middle to the

latter part of June, and it would be interesting to know if they left our shores or not.—STANLEY LEWIS (Wells, Somerset).

Three Nests of Land-Rail in the same Field.—Three nests of the Land-Rail (*Crex pratensis*) were found in the same field during the first week of July by Mr. Moses Say, of Croscombe, near Wells; two containing eggs were destroyed by the knives of the mowing-machine, and one nest had already hatched off, for three young ones were seen with a parent bird. Land-Rails have become rarer here than formerly, and the nesting of three pairs of birds in the same field seems remarkable, for had I been asked I should have said six birds were all we had in the neighbourhood. I saw two of the nests with the broken eggs in them.—STANLEY LEWIS (Wells, Somerset).

Great Crested Grebes in the County of London.—As you were good enough to insert in your last issue my notes on the Great Crested Grebe (*Podiceps cristatus*) breeding in London, I am sending you some further observations on these birds, which perhaps you may think sufficiently interesting to print. The young birds were hatched presumably on July 8th after about four weeks' incubation, and on the 9th I saw the male bird step off the nest with the young ones under his wings. For a day or two both birds kept near the nest, roosting there at night, but the young were always carried under the wings of the male. On July 13th I saw the old birds far out in the open water, but could discover no young ones, although, from the appearance of the male, I gathered they were still under his wings. On July 14th I got near enough to see the young birds under the male's wings, and the female dive repeatedly, and feed them in that position. From that day I saw nothing of them until, on Sunday, July 21st, I made a tour of the reservoir. Walking round, I after a time, with the aid of glasses, detected the old birds on the farthest side among the reeds. I remained still, and after a time they came more into view in the open water. Once or twice I saw dark specks near them, and soon was able to make out that, though nearly a fortnight old and apparently five or six inches long, they were still caressed and fed by the female under the wings of the male. For a short time I had the satisfaction of seeing four young birds in the water, where they dived regularly and continuously, but I imagine rather for practice than food, as both parents were busily engaged in diving and feeding them. In the last edition of 'Yarrell' the Rev. Richard Lubbock is mentioned as an authority for these birds taking their young, for protection, down with them when they dive. This

I have not seen, but I suggest that this habit of carrying the nestlings under the wing for so long after they are hatched is an instinct implanted to preserve the species—apparently a slow-breeding one—from the dangers attendant upon the large sheets of water they



frequent being inhabited by large Pike, Trout, &c. I have known Pike of seventeen pounds taken in the reservoir in which these birds nested.—WM. F. DEWEY (Carisbrooke, Finsbury Park, N.).

Notes on Nest-Boxes.—Though the tenants of our nest-boxes this year have been numerous, there have been none of special interest or rarity. The list is: Robin (in an old water-can in ivy), Great Tit, Blue Tit (two or three of each), Nuthatch (one), Tree-Sparrow (many), House-Sparrow, Tawny Owl, and Stock-Dove. The box occupied by the Tawny Owls is simply an old half-dozen wine-case, placed in the fork of a beech, and kept in position by a heavy drain-brick on the lid. A Stock-Dove had two eggs on Feb. 28th, which is our earliest record of any eggs in a box, and last evening (July 21st) one flew out of the same box, which contained a new nest with two nearly fresh eggs. We

hoped to have been able to add the Jackdaw to our list, as none have ever used the boxes, but the only pair which have nested in the place during the twenty-five seasons we have been here preferred a cavity high up in a beech. This season there has been an unusual amount of "infant mortality" among the birds, whole broods having been found dead in the nests. The last of the four owlets in the box, which was all right on a Friday evening, was dead on the following Sunday, much to the disappointment of some young friends who came to see it. I have often found bees in the boxes, and once a hornet, and it is possible that a sting from some insect might have caused its death.—JULIAN G. TUCK (Tostock Rectory, Bury St. Edmunds).

NOTICES OF NEW BOOKS.

The Depths of the Ocean: a General Account of the Modern Science of Oceanography, based largely on the Scientific Researches of the Norwegian Steamer, 'Michael Sars,' in the North Atlantic. By Sir JOHN MURRAY, K.C.B., F.R.S., &c., and Dr. JOHAN HJORT, with contributions from Professors A. APPELLÖF and H. H. GRAN and Dr. B. HELLAND-HANSEN. Macmillan & Co.

THE name of Sir John Murray will always be associated with the 'Challenger' expedition; it must also be connected with the cruise of the 'Michael Sars,' for Dr. Hjort tells us in his preface that "Sir John Murray wrote to me that if the Norwegian Government would lend the 'Michael Sars' and her scientific staff for a few months' summer cruise in the North Atlantic, he would pay all the other expenses." This volume describes the scientific results of this cruise, results that may well satisfy all concerned, and which afford material of the highest value to the science of Oceanography.

To readers of 'The Zoologist' the biological narrative will prove the most attractive, and chap. x., "General Biology," is worthy of the most careful perusal, for it deals with many

theories and conclusions based on marine animal life. Dr. Hjort soon puts the discussion on a sound foundation. We read:—"But no definite human idea of the fitness of adaptations is of any value as knowledge. No more does any human idea necessarily correspond to the reality occurring in nature. The idea is only valuable as stimulating the investigator to seek realities. And reality in the scientific sense means a definite, positive mechanism, existing in the organism itself or in the surrounding medium. The object of investigation is to understand these mechanisms; the leading idea may often prove an empty fancy beyond the world of realities."

As regards the "Colours of Marine Animals," much information and cautious discussion, assisted by beautiful illustration, are supplied. Here Dr. Hjort is again candid and just. He writes:—"From time immemorial seafaring men have possessed a certain amount of knowledge as to the colours of marine animals. Sailors know well the sky-blue colours peculiar to the tropical surface forms. Herring-fishermen also know that the blackish-brown back of the herring is almost invisible from above, and only when occupying a slanting position or making a sudden turn does the herring become visible, its mirror-like sides emitting a silvery flash. The deep-sea fishermen are equally acquainted with the dark, black, brown, violet, or red colours peculiar to deep-sea animals. No scientist can claim the discovery of these phenomena, which are as well known as the colours of the ocean itself."

This volume contains excellent portraits of those well-known authorities who have made Oceanography a science.

Science of the Sea. An Elementary Handbook of Practical Oceanography for Travellers, Sailors, and Yachtsmen. Prepared by The 'Challenger' Society. Edited by G. HERBERT FOWLER, B.A., Ph.D., &c. John Murray.

OUR previous notice referred to the work done in Oceanography by special and experienced scientists; the present volume is intended for the use of volunteers in the same field of observation. We prefer the term "scientific volunteer" to that of "amateur," the latter name being frequently a term expressive

of some amount of contempt. There is scarcely anyone who travels across the seas, and in whom the scientific spirit—either physical or zoological—is latent, whose observations when properly directed may not corroborate other statements, suggest further study, or be definitely informative. To them this book will prove a boon. We well remember a long sea voyage made more than forty years ago when Maury's 'Physical Geography of the Sea' was the only scientific book contained in the small and very miscellaneous cabin library. Publications of this calibre were then scarcely imagined, especially where the biological element is so fully pronounced. It was still largely then the day of sailing-vessels, and most skippers had almost a superstitious objection to a surface trawl-net—however small—being towed astern. Now the information is available by which a wealthy yachtsman may aspire to make his yacht an infant 'Challenger,' with even more modern appliances; passengers may find a scientific interest that will beguile a long day, even at the expense of "bridge" or deck-cricket; and the trained seaman may in leisure moments study in a fresh direction the element on which he so largely passes his days. This volume should be placed in the library of every liner, and the fond mother who usually places a Bible in the hands of her apprenticed son might with good results present this 'Science of the Sea' at the same time. It is well illustrated.

